REPORT OF COOPERS & LYBRAND, L.L.P. ON THE TESTING OF BELL ATLANTIC'S OPERATIONAL SUPPORT SYSTEM INTERFACES

I. INTRODUCTION AND SUMMARY OF CONCLUSIONS

A. Introduction

The purpose of this report is to provide evidence to the Federal Communications Commission (FCC) of the capacity of Bell Atlantic's operational support systems (OSS) interfaces to handle reasonably expected demand from competitive local exchange carriers (CLECs) in 1998. Specifically, this report discusses the results of tests of Bell Atlantic's pre-ordering and ordering systems and processes conducted between September 1997 and February 1998.[1] Coopers & Lybrand L.L.P. (C&L) was consulted during test design and implementation, and monitored the tests and analyzed test results. We also reviewed tests of Bell Atlantic's provisioning and billing OSS, and examined the company's maintenance and repair systems.

Separate testing was performed for Bell Atlantic's New York/New England region, the area served by NYNEX prior to its merger with Bell Atlantic, and the company's Mid-Atlantic region, the area served by Bell Atlantic prior to the merger. The methodologies employed in the testing were substantially similar between the regions.

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[1]The pre-ordering systems and processes provide the interface to Bell Atlantic's legacy systems that contain the customer information and other data necessary for the CLEC to complete a service order with Bell Atlantic. The ordering systems and processes provide the interface for CLEC access to Bell Atlantic's order processors and to the downstream provisioning and billing systems which are largely shared between retail and wholesale operations.

B. Summary of Conclusions

A high volume "stress test" of Bell Atlantic's pre-ordering OSS interfaces indicated that the company's combined New York and New England regions can process at least 5,700 pre-order transactions per hour, or over 46,100 transactions per eight hour day. This test volume is more than three time the average daily transaction volume forecast by Bell Atlantic for 1998 in its combined New York and New England regions.

A stress test of the pre-ordering OSS interfaces in Bell Atlantic's Mid-Atlantic region showed that the company can process approximately 10,300 pre-order transactions per hour, or over 82,000 transactions per eight-hour day. This test volume is eight times greater than the average 1998 daily transaction volume forecast by Bell Atlantic for its Mid-Atlantic region.

A high volume "end-to-end test" was conducted separately for each of Bell Atlantic's New York and Mid-Atlantic regions to assess the capacity of the company's ordering OSS interfaces. The New York test demonstrated that the company could process at least 7,500 orders in one day, nearly three times the company's forecast for average daily volumes in 1998 for Bell Atlantic's combined New York and New England regions.[2] The Mid-Atlantic test showed that the company could process at least 10,100 orders in one day, nearly six times its forecast of average daily volumes in 1998 for the Mid-Atlantic region. As a general matter, the test orders were processed at performance levels that met or exceeded the company's performance targets in New York; the few exceptions are addressed below. In the Mid-Atlantic region, the test orders were

[2] New York and New England share the same pre-ordering and ordering systems and processes.

processed at performance levels that met the company's targets for six of the twelve performance measurements.

The testing of the ordering OSS interfaces also indicated that New York could provide significant levels of electronic flow-through (i.e., order processing that does not require any manual intervention), with 87% of total resale orders flowing through, and 73% of all test and live resale and unbundled network element orders flowing through. The testing also showed that the Mid-Atlantic region can provide significant levels of electronic flow-through, with 76% of total resale orders and 70% of combined resale and unbundled network element orders flowing through.

Our review showed that Bell Atlantic's wholesale provisioning processes are the same as its retail processes with the exception of provisioning for unbundled loops and loop/port combinations which do not have a retail counterpart. Analysis of New York and New England provisioning capacity showed that the combined region-wide capacity is approximately 300 unbundled loop conversions per day, in addition to any new loops that are ordered, with added capacity readily obtainable with the deployment of trained personnel to the wholesale provisioning centers. In the Mid-Atlantic region, results of the end-to-end test showed that 674 unbundled network element orders (loop conversions and loop/port combinations) were provisioned on the peak volume day.

Separate tests of the New York and New England billing systems indicated that those systems can accurately capture a variety of call types generated by a CLEC over different types of lines (e.g., resale, unbundled loops). One of the two billing usage tests in the Mid-Atlantic region did identify issues (i.e., intraLATA toll and directory assistance

calls were not captured on lines consisting of an unbundled loop/port combination) which we understand have been addressed by Bell Atlantic.

Finally, our review of the maintenance and repair processes for New York and New England confirmed that the "front-end" trouble reporting and resolution process is similar for Bell Atlantic's retail and wholesale operations. In the Mid-Atlantic region, the front-end processes provides similar functionality for both wholesale and retail operations. In all regions, the "back-end" trouble resolution process is identical for both wholesale and retail operations, and repair tickets are not given any preferential treatment based on their wholesale or retail status.

II. SCOPE OF REVIEW AND TEST DESCRIPTIONS

A. Overview

C&L's review of the testing of Bell Atlantic's OSS interfaces was conducted by a multi-disciplinary team of consulting professionals experienced in telecommunications, systems consulting, process engineering, simulation modeling, and telecommunications regulation. The C&L team was jointly led by Stuart McIntosh and Gerard Mulcahy, both principals in C&L's Telecommunications and Media Practice with extensive telecommunications experience. Mr. McIntosh first joined C&L's UK practice in 1979 and transferred to the US practice in 1996. From 1986 to 1990, he held senior management positions at British Telecommunications. Mr. McIntosh has consulted for telecommunications clients in over 25 countries and has led engagements covering a broad

spectrum of telecommunications related issues including operational and process modeling, market entry options and opportunities, interconnection, and equal access.

Mr. Mulcahy has over 26 years experience in the telecommunications industry, including 13 years with C&L. He previously was employed with AT&T Communications and served for over 12 years on the staff of the New York Department of Public Service. Mr. Mulcahy has also led a wide variety of engagements for telecommunications clients both in the US and abroad including those involving process design and re-engineering, product costing and pricing, operations analysis and productivity improvement.

While the pre-order transaction volumes and order volumes used in the tests were determined by Bell Atlantic, and the tests were designed and executed by Bell Atlantic, C&L was consulted during the test design and implementation process. In addition, during each of the test days, C&L had staff at various operations centers and company offices to observe whether Bell Atlantic personnel were following test and normal business procedures and, in those instances where manual data generation was required, were recording time intervals and other test data accurately. We also observed whether Bell Atlantic's OSS-related activities (both mechanized and manual) during the test were consistent with its normal procedures. Additionally, we monitored the operations of the independent third party that functioned as the test-CLEC[3] to ensure that the local service requests (LSRs) were transmitted to Bell Atlantic as intended by the test design and that test metrics or measurements were captured in an accurate manner.

[3] IMI Systems, Inc., a systems integration consultant, functioned as the test-CLEC.

B. Test Descriptions

The purpose of the testing was to determine the ability of Bell Atlantic's OSS interfaces to handle CLEC order volumes equal to or exceeding those projected for 1998. The end-to-end test used to evaluate the ordering OSS interfaces was also used to assess Bell Atlantic's downstream provisioning and billing systems.

Although the New York pre-ordering and ordering tests were initially intended to evaluate Bell Atlantic's ability to process daily CLEC order volumes projected for 1998, the test results are also applicable to Bell Atlantic's New England region. Our review showed that New York and New England share the same wholesale pre-ordering and ordering OSS. Our review further showed that the New York and New England backend pre-ordering and ordering legacy systems are largely the same with only minor differences in the platforms for the ordering systems. We also found no material difference in the processes used to provision wholesale service. Finally, while there are differences between New York's and New England's billing systems, our review showed no difference in wholesale billing performance.

1. Pre-ordering Stress Tests

To test the pre-ordering OSS interfaces in New York and the Mid-Atlantic region, Bell Atlantic conducted high volume stress tests simultaneously with the high volume end-to-end tests used to evaluate the ordering OSS interfaces. Both the New York and Mid-Atlantic pre-order stress tests were conducted over a three-hour period, and were designed to simulate real pre-order transaction processing.

a. New York Pre-ordering Test

The New York pre-order stress test simulated pre-order transactions at levels exceeding the company's 1998 forecasts for the combined New York and New England regions. The test was conducted during the second (peak volume) day of the end-to-end test. Because the New York pre-ordering and ordering processes share the same system, combining the pre-ordering transactions and order volumes during the end-to-end tests provided the opportunity to assess both systems. We also tracked live pre-order activity for the first and third days of the end-to-end test in order to have a "baseline" for comparative purposes with peak day volumes.

During the test, Bell Atlantic processed a constant load of 5,765 simulated pre-order transactions per hour that were submitted by the equivalent of 200 simultaneous users to the pre-ordering systems.[4] This was the maximum number of users permitted by the test simulation; not necessarily the maximum that could be accommodated by the pre-ordering interface. The transaction load was calculated to exceed the level of pre-order transaction volumes likely to be associated with the generation of 7,500 CLEC orders, the peak day volume of the end-to-end test. To perform the test, Bell Atlantic developed a computer simulation application that submitted the pre-determined volumes of pre-order transactions from outside the company's "firewall" (i.e., security interface) through to the New York region's legacy systems.

b. Mid-Atlantic Pre-ordering Test

[4] The transaction volume was divided on an approximately 2-to-1 basis between customer service record (CSR) transactions and non-CSR transactions. This distribution reflected historical transaction ratios during June and July 1997.

The Mid-Atlantic's pre-order stress test was also conducted during that region's end-to-end test. In total, 31,138 pre-order transactions were simulated during the three hour test, a volume exceeding the level of pre-order transaction volumes likely to be associated with the generation of 10,000 CLEC orders, the "peak day" order volume in the end-to-end test.[5] The number of users (both test and live production) on the system during the test fluctuated between 788 and 804.

The majority of the transactions during the Mid-Atlantic test were submitted to the pre-ordering legacy systems by a computer simulator located *inside* the pre-order system firewall. However, a separate simulator residing *outside* the firewall generated the transactions used during the test period to measure system response times.

2. End-to-End Testing

The capacity of Bell Atlantic's ordering OSS interfaces was evaluated through separate high volume end-to-end tests conducted in the New York and Mid-Atlantic regions. The end-to-end tests were also used to evaluate Bell Atlantic's downstream provisioning and billing OSS. Overall, for both regions, the test order volumes and order mix were designed to utilize, to the extent feasible within the parameters of the test, the company's operational support systems and all relevant manual processes in a manner similar to the expected use of those systems and processes in 1998. As a result, both tests reflect the demands likely to arise in a high volume, mainly POTS, environment with order

[5] The transaction volume was distributed between the two major transaction types (customer service record (CSR) requests and non-CSR address validation queries) based on the roughly four CSR to one address validation ratio of transaction types expected in live production (occurrences of other transaction types have been *de minimis* based on historical volumes).

transmission and related notification being conducted via electronic interfaces. The tests were not designed to "scale up" the current order mix or to replicate the largely facsimile-based transmission media currently employed by CLECs in submitting orders in the Mid-Atlantic region.

In both the New York and Mid-Atlantic end-to-end tests, the order volumes included live orders and "test" orders received from a third party (the "test-CLEC"). The test-CLEC volumes were comprised of test orders generated by Bell Atlantic, and were electronically transmitted to Bell Atlantic's ordering system by the test-CLEC. The test-CLEC was responsible for the following functions during the end-to-end test: (1) formatting test orders for electronic data interface (EDI) transmission; (2) transmitting test order requests to Bell Atlantic via an independent value-added network provider; (3) responding to queries from Bell Atlantic concerning the orders transmitted; (4) receiving firm order confirmations (indicating that the service request was ready for provisioning), reject notices and service order completion notices (indicating that provisioning was complete); and (5) collecting relevant performance metrics.

For both tests, the orders submitted by the test-CLEC were prepared by Bell Atlantic and included service requests for new resale service lines, resale conversion orders without feature changes, resale conversion orders with feature changes (e.g., call return, call waiting, optional call plan, blocking), plus new and converted unbundled network element orders. For the New York end-to-end test, Bell Atlantic used spare lines and actual employee accounts as the source of its service orders. For the Mid-Atlantic

test, Bell Atlantic used actual employee lines and residential/business POTS accounts created specifically for the test.

In both tests, resale conversion orders were transmitted by the CLEC to the appropriate Bell Atlantic order processing system, via EDI and, in the case of unbundled network element platform orders in New York, by electronic interface format (EIF). Based on the information provided in the service requests, they were either (1) processed through the ordering system to provisioning; (2) rejected by the systems as being in error and returned to the test-CLEC; or (3) transferred to a company representative for manual processing. Consistent with Bell Atlantic's normal operating procedures, certain orders were transmitted to a third party contractor for manual processing.

In both tests, the test-CLEC orders were generally provisioned (e.g., changes were made in the switch where required to reflect service features ordered by the test-CLEC) and processed through to billing which resulted in the transfer of the customer from Bell Atlantic to the test-CLEC account. The one exception concerned the provisioning of orders for new lines. Approximately 150 of the new line orders in New York, and approximately 50 of the new line orders in the Mid-Atlantic region, were processed through the systems to installation, including the dispatch of technicians in the field. The remaining new line orders were "future dated" (i.e., assigned a due date far in the future) and canceled in the provisioning system following the tests. This allowed for the testing of the interfaces for new line ordering and provisioning, while not requiring the company to incur the cost in all instances of actually "rolling a truck" or installing a "drop" to the home, functions which are performed identically for both retail and wholesale operations.

The order mix in the end-to-end tests was intended to reflect the mix of orders Bell Atlantic expects to receive under high volume conditions in 1998. However, unbundled loop conversion orders were not included in the New York end-to-end test except to the extent that they occurred in live production.[6] Unbundled loop conversion test orders were included in the Mid-Atlantic region test, although at a somewhat lower level than expected in 1998.[7] A number of loop/port combination orders were included in the Mid-Atlantic region end-to-end test, and in supplemental testing conducted in the New York region in February 1998.

There were some differences between conditions and assumptions which applied during the test (e.g., the percent of orders received by Bell Atlantic via EDI, the number of single line POTS orders) and the conditions which Bell Atlantic encounters today in handling live production orders.[8] These differences are largely attributable to the objectives of the test – i.e., to determine Bell Atlantic's ability to receive and process CLEC orders at volumes anticipated in 1998, taking account of the transmission media (e.g., EDI), order mix and flow-through potential likely to be required to accommodate large scale order receipt and processing.

The following table shows the total volumes of each order type that were processed during the New York and Mid-Atlantic end-to-end tests:

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[6] Unbundled network element loop/port combinations were not included in the New York end-to-end test, but were separately tested by Bell Atlantic on February 5, 1998. The New York test did include 17 live and 2,418 test platform orders, and 33 live unbundled loop orders.

[7] These orders, however, were provisioned in just six central offices. This aspect of the test was not designed to evaluate capacity across the entire Mid-Atlantic region.

END-TO-END TEST ORDER VOLUMES PROCESSED

	Resale	UNE	Total
New York (3 days)	12,865	2,468	15,330
Mid-Atlantic (5 days)	27,995	2,070	30,065

a. New York End-to-End Test

The New York end-to-end test was conducted over a three-day period, October 1 to 3, 1997, and consisted of two days of approximately 4,000 live and test orders per day and a peak volume day of nearly 7,500 live and test orders. The total order volume (both test orders and live production) of approximately 15,300 CLEC service requests submitted over the three-day period is almost twice the average order flow currently projected by Bell Atlantic for its combined New York/New England regions during 1998. For the non-peak and peak volume days, the New York test order volumes exceed 1998 projected average daily volumes of roughly 2,600 orders per day for the combined regions by nearly 54% and 185%, respectively.

Supplemental testing was conducted on February 5, 1998, to evaluate the New York region's ability to process unbundled network element loop and port combination orders.[9] For this test, Bell Atlantic developed 152 unbundled loop service requests and 152 unbundled port service requests. Each loop request was related to a port request by

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[8] These differences are discussed in the "Report of Bell Atlantic on the Capacity of the Interfaces to Its Operations Support Systems to Handle Reasonably Expected Demands" which accompanies this report.

[9] The provisioning activities associated with these orders were completed by February 13, 1998.

coordinated purchase orders numbers (PONs). The two related requests were treated as one loop/port combination order and were transmitted by the test-CLEC to Bell Atlantic for processing and provisioning.

On January 30 and February 6, 1998, Bell Atlantic also performed additional testing for New York and New England to evaluate the performance of an upgraded electronic data interface (EDI) version 7.0 system as compared to the EDI version 6.0 and EIF[10] systems used during the end-to-end testing. The purpose of the test was to show that EDI version 7.0 could process the same orders as EDI version 6.0 (for resale orders) and the EIF interface (for unbundled network element orders), and do so at similar performance levels. The test was conducted by processing orders (850 resale and 169 unbundled network element orders) received from the test-CLEC through EDI version 6.0/EIF and EDI version 7.0 and comparing the results.

b. Mid-Atlantic End-to-End Test

The end-to-end test for the Mid-Atlantic region was conducted over a five-day period, January 12 to 16, 1998, and consisted of four days of approximately 5,000 live and test orders per day and a peak volume day of nearly 10,100 live and test orders. The total of approximately 30,100 test and live service requests submitted over the five day period was nearly 3½ times the volume projected by Bell Atlantic for its Mid-Atlantic region over a typical five day period in 1998. The daily test volumes exceed the 1998 projected daily volumes of approximately 1,740 orders for the region by approximately 187% and 480% for the non-peak and peak volume days, respectively.

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[10] EIF is Bell Atlantic's proprietary electronic interface format.

Our test monitoring largely confirmed that the company followed standard procedures in processing the live and simulated orders during the course of both end-to-end tests. However, service representatives in two of the processing centers in the Mid-Atlantic region used templates for order data entry which contained pre-coded information, including end user specific information. Some of this information would not be available on templates used for live production.[11] This issue potentially affected the processing of 1,459 unbundled network element orders in Bell Atlantic's Silver Spring, Maryland, and Pittsburgh, Pennsylvania, order processing centers.

To assess the potential impact of the use of these templates, further analysis was undertaken in one center (Silver Spring) subsequent to the test. The analysis indicated that the total difference in data entry times (comparing the times using the templates typically employed in live production and those using the test templates) was 2 minutes 14 seconds per order (on average), of which 30 seconds related to the time required to input the end user specific information. Based on the results of the further analysis, we conclude that the use of the templates in the Mid-Atlantic test was unlikely to have had a material impact either on Bell Atlantic's ability to process the test volumes, or on the performance measures related to those volumes.[12]

III. PRE-ORDERING INTERFACE TEST RESULTS

A. New York/New England Results

[11] Templates were not used in the New York test.

[12] Use of the test templates may have also reduced the number of order entry errors. We have not assessed the potential impact of this factor on test results.

During the test, the pre-ordering system that serves the New York and New England regions processed a constant load of 5,765 simulated pre-order transactions per hour over a three hour period, equivalent to 46,120 transactions per eight hour day. The test transaction volume compares to an average daily volume of 2,120 pre-order transactions processed by Bell Atlantic in its New York and New England regions in December 1997, and are more than three times the average daily volume forecast by Bell Atlantic for the combined New York and New England regions for 1998.

The relevant average pre-ordering response times from the peak day of the test are set forth in the table below. The table also includes the average live production pre-ordering response times from the non-peak first and third days of the end-to-end test:

PRE-ORDERING PERFORMANCE – NEW YORK REGION

Transaction Type	**Peak-Day Wholesale Response Time (secs.)**	**Non-Peak Wholesale Response Times (secs.) Average During Test**
CSR	7.7	4.7
Non-CSR	17.2	10.6

These results show that during the period of very high volumes covered by the test, pre-order response times averaged 7.7 seconds (for CSR transactions) and 17.2 seconds (for non-CSR transactions). The test also showed that response times vary with transaction volumes. In particular, under more typical operating conditions as measured during the non-peak volume days of the end-to-end test, CSR average response times decreased by 3.0 seconds to an average of 4.7 seconds, and non-CSR pre-order transaction average response times fell by 6.6 seconds to 10.6 seconds.

B. Mid-Atlantic Results

In total, 31,138 pre-order transactions were simulated and processed through the pre-ordering system which serve the Mid Atlantic region during the three hour period of the stress test. The Mid-Atlantic pre-ordering stress test indicated that the company can process approximately 10,300 pre-order transactions per hour, or over 82,000 transactions per eight-hour day, with up to 804 users on the system simultaneously. This transaction volume compares to an average daily volume of 13,186 pre-order transactions in December 1997 for the Mid-Atlantic region, and is eight times greater than the average 1998 daily transaction volume forecast by Bell Atlantic.

The pre-order stress test measurements were compared to "baseline" wholesale measurements made under current live volume conditions in order to evaluate changes in system performance under high volumes. Average wholesale pre-order stress test response times and the baseline period wholesale response times are set forth in the table below:

PRE-ORDERING PERFORMANCE – MID-ATLANTIC REGION

Transaction Type	Wholesale Test Response Time (secs.)	Baseline Period Response Time (secs.)
CSR	4.8	4.6
Non-CSR	10.0	6.1

Unlike the New York pre-ordering stress test, the high volume conditions existing during the Mid-Atlantic test produced only a slight change in wholesale response times for CSR information as compared to low volume baseline response times (4.8 vs. 4.6 seconds). The difference between test and baseline response times was 3.9 seconds for the address validation transactions (10.0 seconds vs. 6.1 seconds).

IV. ORDERING INTERFACE TEST RESULTS

A. Introduction

The end-to-end testing described in the previous section served as the principal vehicle for assessing the capacity and performance of Bell Atlantic's ordering interfaces. Again, because the New York and New England regions utilize the same wholesale systems and processes for ordering, we were able to assess the New England region's capabilities based on the New York test.

Our review of the end-to-end test results allowed us to assess the ability of the ordering systems to process each of the order types included in the test. To evaluate ordering performance, we compared the results of the end-to-end test with performance targets specified by Bell Atlantic.

For purposes of the test, the ordering metrics included:

- *Percent Flow-Through*, which is the number of orders processed directly by the ordering interface directly to the legacy provisioning OSS without manual intervention as a percentage of total orders (or as a percentage of orders relevant to the type of flow-through being measured).

- *Order Reject Rate*, which is the percentage of total orders received by Bell Atlantic that are rejected or queried to the CLEC due to CLEC error or omission.

- *Order Reject Timeliness*, which is the average response time from receipt of an order request by Bell Atlantic's ordering interface to the distribution of a reject notification or query.

- *Order Confirmation Notification Timeliness*, which is the average response time from receipt of a valid order request by the ordering interface to the distribution of a service order confirmation.

- *Order Completion Notification Timeliness*, which is the average interval between actual order completion date to the distribution to the test-CLEC of order completion notification from Bell Atlantic.

B. New York Results

1. Initial End-to-End Test

The New York test demonstrated that Bell Atlantic is capable of processing volumes of orders significantly greater than those it is currently receiving, including the ability to process 4,000 orders on two non-peak volume days, and at least 7,500 orders on a peak day. Our review also showed that there is additional capacity available on the

mechanized systems that provide wholesale ordering, pre-ordering and maintenance and repair functions. Specifically, systems capacity utilization averaged 35% during the two average volume days and 54% during the peak volume day, with a maximum utilization of 66% during the peak day.

During the test, 94% of the resale test orders flowed through. Cumulatively, 87% of the New York region's total (live plus test) resale orders and 73% of total orders (resale and unbundled network element) flowed-through the ordering processes without manual intervention. Reject rates range from 23% for live unbundled loops to 0.6% for test platform orders.

In addition, the test results show that the New York region exceeded its performance targets for most of the test order measurements tracked during the test.[13] The New York region was 100% within the performance targets for eight of 12 timeliness metrics. The remaining four timeliness measures, which met the performance targets 67% to 89% of the time over the test period, include confirmation notice timeliness related to resale flow-through (85%) and unbundled loops (70%), and rejection notice timeliness related to resale flow-through (89%) and unbundled loops (67%). After the first day of the New York test, Bell Atlantic made modifications to the EDI systems that resulted in improved average response time. By the last day of the test, the company was meeting or surpassing performance targets for all order types, except timeliness of order confirmations for unbundled loops.

2. Additional New York/New England Testing

Our review of the metrics generated by the testing of the New York Region's EDI version 7.0 interface indicates that it was able to process the resale orders used in the test within the specified performance targets, although with a slower processing time than experienced using EDI version 6.0.[14] The EDI version 7.0 interface was also employed in processing the unbundled network element orders included in the supplemental test; metrics were not available to compare processing performance to the EIF interface previously used to process this order type.

The test results for the supplemental testing of the unbundled loop/port combination orders showed that none of the service orders for the loop/port combinations were rejected and 71% of the orders were confirmed to the test-CLEC within a 24-hour period.[15] Completion notification timeliness metrics were not available for inclusion in this report due to the timing of the loop/port provisioning activities.

C. Mid-Atlantic Results

Like the New York test, the high volume test in the Mid-Atlantic region demonstrated that Bell Atlantic's ordering interfaces, systems and processes are capable of processing volumes far in excess of those it currently receives from CLECs. Specifically, the test showed that Bell Atlantic can process approximately 5,000 orders on a non-peak

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[13] The performance results from the test in the New York region are contained in the appendix to this report, Table A.

[14] We understand that the slower processing time could be attributable to the enhanced functionality provided by EDI version 7.0.

[15] Due to coding errors, 29% of the orders were not recognized by EDI initially and, therefore, were confirmed to the test-CLEC beyond the targeted 24-hour period.

day, and at least 10,100 orders on a peak day. Our review also showed that there is additional ordering system capacity available. Specifically, ordering systems capacity utilization averaged 29% during the three average volume days for which measurements were recorded, and 67% during the peak volume day, with a maximum hourly utilization of 85% during the peak day.

During the test, 84% of the resale test orders flowed through. Cumulatively, 76% of the Mid-Atlantic region's resale orders (live plus test) and 70% of total orders (resale and unbundled network element) flowed-through the ordering processes without manual intervention. As demonstrated by the end-to-end test, the ordering OSS currently support flow-through capabilities for certain resale as-is and resale as-specified order types. Reject rates were far lower for the test orders (0.1% to 3%) than for the live orders (14% to 36%).

As described above, the Mid-Atlantic ordering performance measurements for the test orders include percent flow-through, order reject rates, order reject timeliness, order confirmation notification timeliness, and order completion notification timeliness. In the Mid-Atlantic test, it was possible to capture the relevant performance measures for the live orders received during the test, and these results are reported as well.[16] The results indicate that the company's performance targets with regard to the test orders was exceeded for six of the twelve timeliness measurements, including confirmation timeliness for resale manual orders, and unbundled network element loop and platform orders, as well as error notification timeliness for the same order types.

Confirmation and rejection notification timeliness targets were not met for resale flow through orders largely because of a transmission problem that occurred on the final day of the test and which affected a significant number of orders. Timeliness targets were not met for the dispatch of completion notifications (for both resale and unbundled network element orders) and this was also largely attributable to the same single transmission problem. We understand that the underlying problem has now been identified and addressed.

The results for the test-orders were somewhat better than the live order results. For example, confirmation notification timeliness for live resale manual orders was 88% within the company's performance target, compared to 94% for the comparable test orders, and rejection notification timeliness for live unbundled loop orders was 95% within target, compared to 100% for test orders.

V. REVIEW OF PROVISIONING, BILLING, AND MAINTENANCE AND REPAIR

A. Introduction

Our review of Bell Atlantic's provisioning processes was based on the performance of the company's provisioning OSS during the end-to-end tests and analysis of unbundled loop provisioning capacity. For billing, we evaluated the company's ability to capture call usage data and provide that data to CLECs in a timely manner. With respect to maintenance and repair, we sought to determine the extent of commonality in the processes and systems employed in handling wholesale and retail trouble reports. The

[16] The performance results from the test in the Mid-Atlantic region, including the results of processing

scope of our review was broadly similar for the New York and Mid Atlantic regions – some additional analysis was undertaken in New England and, as described below, the testing of unbundled network element loop provisioning differed between the New York and Mid-Atlantic tests.

B. Provisioning Testing and Results

The end-to-end tests described above were used to assess the capacity of the New York, New England and Mid-Atlantic regions to provision expected CLEC order volumes in 1998. To evaluate the similarity of provisioning between wholesale and retail operations, we conducted interviews in all three regions and compared wholesale and retail provisioning processes and systems. We also selected a sample of order types and traced the orders through the provisioning systems to determine if wholesale and retail orders use the same systems and in a similar manner.

1. New York Results

The New York region test did not include unbundled loop conversion orders other than those presented in live production. As a result, we conducted a separate assessment of the New York/New England region's unbundled loop provisioning capacity. We analyzed processing times taken during live production at centers in New York and New England responsible for provisioning unbundled loop conversions. Our analysis also encompassed Bell Atlantic's region-wide unbundled loop provisioning activities for New York and New England, including those conducted at the company's Regional CLEC

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live production, are contained in the appendix to this report, Table B.

Coordinating Center (RCCC), which coordinates unbundled loop provisioning activities, and at the Recent Change Memory Administration Center (RCMAC), which handles switch translations for unbundled loop conversions and other order types.

With regard to unbundled loop conversion provisioning, our review indicates that the RCMAC, which supports wholesale and retail activities in both New York and New England, can complete approximately 300 line translations per day based on staff levels then in place. Time and activity studies conducted at the RCCC for New York and New England indicated a capacity to process nearly 400 unbundled loop conversion lines per day. Bell Atlantic has indicated to us that the company can readily deploy trained personnel to augment the capacity in the RCMAC and RCCC serving New York and New England should that be required. Assuming that such deployment occurs on a timely basis, Bell Atlantic should be able to meet the projected increase in unbundled loop conversion orders.

The results of our review showed that Bell Atlantic's wholesale provisioning systems in New York and New England are the same as those used for retail order provisioning. The only exceptions, among the order types considered in our review, were unbundled loop conversions and loop-port combinations, neither of which has a retail counterpart. The New York test results also indicate that Bell Atlantic is able to complete the provisioning process for both resale and unbundled network element orders within the "offered interval" specified at the time of order receipt.

2. Mid-Atlantic Results

Unlike New York, the test for the Mid-Atlantic region included unbundled loop conversion and loop-port combination test orders and provided direct evidence of the capacities of the companies regional provisioning centers – the RCCC and the RCMACs. As noted above, unbundled loop conversion and loop-port combination test orders were included in the Mid-Atlantic end-to-end test. The test procedures emulated most aspects of the live production environment.[17] An average of 262 unbundled network element orders (including loop conversion and loop/port combination orders) were provisioned in six central offices on the four non-peak volume days of the test, 674 unbundled network element orders (loop conversions and loop/port combinations) were provisioned on the peak volume day. The testing for the Mid-Atlantic region showed that the company could provision the reviewed order types – unbundled loop conversions and loop-port combinations. The unbundled loop and loop/port combination volumes processed on the peak day of the Mid-Atlantic test (674 orders), which exceed the average daily volume of unbundled loop conversion and loop/port combination orders projected by Bell Atlantic in 1998, also provide a minimum estimate of capacity of the company's regional provisioning centers (e.g., the RCCC and the RCMAC)

The results of our review showed that Bell Atlantic's wholesale provisioning systems are the same as those used for retail order provisioning. The only exceptions, among the order types considered in our review, were unbundled loop conversions and loop-port combinations, neither of which has a retail counterpart. While preliminary data for the Mid-Atlantic region suggest that Bell Atlantic is able to complete the provisioning

[17] Due to the test design, dialtone was not present on the unbundled loop and loop/port combination test

process for both resale and unbundled network element orders with the "offered interval" specified at the time of order receipt, further review is required to confirm these results.

3. Provisioning System Utilization

Our review of system utilization data for the months in which the tests were conducted (October 1997 for New York and January 1998 for Mid-Atlantic) show that utilization was typically in the range 50-75%. This indicates that the mechanized systems should have more than sufficient capacity to handle the retail and wholesale order volume anticipated during 1998.

C. Billing Testing and Results

The purpose of the billing analysis was to evaluate Bell Atlantic's ability to capture wholesale usage data and provide that data to CLECs in a timely manner. We did not evaluate the accuracy of the amounts charged for each service or product feature.

1. New York and New England

In each of the three Bell Atlantic regions, we compared the processes for collecting wholesale and retail data, and conducted stand-alone usage tests. For New York and New England, the usage test involved placing thirteen calls representing 12 call types (e.g., local intraswitch, local interswitch, local toll, 1-800) over each of 14 test lines at facilities in each region. Usage data were captured for all test calls as part of the

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lines.

company's normal billing generation process. We reviewed the accuracy of the resulting usage data, comparing the 'test script' with the call records on the daily usage files. We also reviewed end-to-end test data for New York and obtained historical statistics measuring the timeliness of the New England region's delivery of daily usage records to CLECs.

The results of our usage analyses for New York and New England revealed that all test calls appeared accurately on the usage file.[18] Additionally, data from the New York end-to-end test indicated that nearly 100% of all usage records were delivered within six days, and 86% were delivered within three days.[19] In New England, billing usage timeliness measurements for the fourth quarter of 1997 showed that over 96% of all records were delivered within four days.[20]

2. Mid-Atlantic

In the Mid-Atlantic region, we conducted separate billing usage analyses for the two billing systems used in the region.[21] For each test, 13 calls representing the 12 most common call types were made over 15 telephone lines. As with New York and New

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[18]The initial billing usage tests for New York and New England experienced systems-related problems which required that the tests be re-run.

[19] New York has performance targets for delivering usage data to CLECs within three business days for calls recorded by switches with teleprocessing, and within six days for calls recorded by switches without teleprocessing. The test data did not distinguish between usage records with a three-day performance target and records with a six-day target.

[20] New England has performance targets for delivering usage data to CLECs within four business days for calls recorded by switches with teleprocessing, and within seven days for calls recorded by switches without teleprocessing. The historical data did not distinguish between usage records with a four-day performance target and records with a seven-day target.

[21] The Pennsylvania billing usage test was re-run due to systems-related problems.

England, we reviewed the call data generated on the daily usage file (DUF) against the test script to determine whether all calls were captured. We also determined whether DUFs generated during the end-to-end test were made available to the test-CLEC on a timely basis.

The results of our usage analyses for Mid-Atlantic indicated that most call types included in the test were recorded accurately on the daily usage file. There were exceptions regarding certain call types tested in the Pennsylvania region. In particular, the system did not capture local toll and directory assistance calls made over lines provisioned with unbundled loop/port combinations. We understand that these issues have been addressed by Bell Atlantic. Our review of daily usage file delivery timeliness indicates that the Mid-Atlantic region met its target by delivering over 97% of usage data to the test-CLEC within three business days.

D. Review of Maintenance and Repair

The purpose of the maintenance and repair analysis was to understand areas of process commonality and to compare wholesale and retail operations. We reviewed both wholesale and retail maintenance and repair systems and processes. For the "front-end" repair process (i.e., the receipt of trouble reports and initial trouble resolution), which is distinct for retail and wholesale, we confirmed the functionality of the retail and wholesale front-end interfaces and the role of the respective retail and wholesale M&R centers. For the "back-end" repair process (i.e., resolution of repair problems that cannot be cleared at the front-end), we determined the degree to which retail and wholesale repair tickets travel

through the same systems and are routed to the same dispatch and technical groups within Bell Atlantic.

1. New York and New England

Our review of the maintenance and repair processes for New York and New England confirmed that the front-end trouble reporting and resolution process, while employing different systems, is similar for retail and wholesale operations. The retail front-end interface and the wholesale front-end interface each provide support in testing customer lines; creating, modifying and closing a trouble ticket; and accessing trouble ticket status and history. CLECs have access to all basic functionality accessed by Bell Atlantic's retail representatives. For mechanized line testing, CLECs are required to perform fewer work steps than required of a Bell Atlantic representative.

Additionally, we used company system audit trail reports to trace retail and wholesale repair tickets through the back-end systems. The tracing indicated that retail and wholesale tickets access the same systems. Our further review confirmed that retail and wholesale repair tickets are also routed downstream to the same Bell Atlantic dispatch and network repair groups for resolution. Repair tickets are not given any preferential treatment based on their retail or wholesale status.

2. Mid-Atlantic

Our review of the maintenance and repair process for the Mid-Atlantic region confirmed that the front-end trouble resolution process is similar for Bell Atlantic's retail and wholesale operations. The retail and wholesale front-end system interfaces each provide Bell Atlantic repair representatives with support in testing the line; creating,

modifying, and closing a trouble ticket; and accessing trouble ticket status and history. CLECs have the ability to create and send repair requests to the company and secure repair commitment dates through an electronic interface; however, they do not have direct access to mechanized line testing and repair ticket statusing. For these functions, the CLEC calls the Mid-Atlantic region Regional CLEC Maintenance Case Team (RCMCT) which is an operations center dedicated solely to helping resolve repair troubles for CLECs. RCMCT representatives assist CLECs in trouble-shooting customer problems. They also track, manage (and in some cases pro-actively escalate) repair tickets on behalf of the CLECs as the repair tickets travel downstream to the network repair groups. Retail representatives do not keep track of repair tickets once they have been sent downstream.

We traced retail and wholesale repair tickets through the back-end systems. The tracing indicated that retail and wholesale tickets access the same systems. Our further review confirmed that retail and wholesale repair tickets are also routed downstream to the same Bell Atlantic dispatch and network repair groups for resolution. Repair tickets are not given any preferential treatment based on their retail or wholesale status.